Kinetic studies of the partially purified molybdenum-reducing enzyme from Bacillus pumilus strain Lbna

ABSTRACT

Bacterial based remediation of environmental toxicants is a promising innovative technology for molybdenum pollution. To date, the enzyme responsible for molybdate reduction to Mo-blue from bacteria show that the Michaelis-Menten constants varies by one order of magnitude. It is important that the constants from newer enzyme sources be characterized so that a comparison can be made. The aim of this study is to characterize kinetically the enzyme from a previously isolated Mo-reducing bacterium; Bacillus pumilus strain Lbna. The maximum activity of this enzyme occurred at pH 5.5 and in between 25 and 35 °C. The Km and Vmax of NADH were 6.646 mM and 0.057 unit/mg enzyme, while the Km and Vmax of LPPM were 3.399 mM and 0.106 unit/mg enzyme. The results showed that the enzyme activity for Bacillus pumilus strain Lbna were inhibited by all heavy metals used. Zinc, copper, silver, chromium, cadmium and mercury all caused more than 50% inhibition to the Mo-reducing enzyme activity with copper being the most potent with an almost complete inhibition of enzyme activity observed.

Keyword: Molybdenum; Mo-reducing bacterium; Bacillus pumilus; Mo-reducing enzyme; Characterization